

ANNEX F

WEAPONS CHARACTERISTICS AND EFFECTS

CHARACTERISTICS OF US ANTIARMOR MISSILES

MISSILE	PRIME MOVER	WEIGHT (LBS)	GUIDANCE LINKAGE	ROUNDS ABOARD	RANGE (METERS)
<i>TOW</i>	M113AI guided missile carrier or improved TOW vehicle	40 (round only)	Wire	10	3,750 max 65 min
	AH-1S Atk Hel			8	
	M2 IFV			7	
	M966 (1 1/4 ton truck)			6	
	M3 CFV			12	
<i>Hellfire</i>	AH-64 atk hel OH-58D (KW)	100 (round only)	Laser-designated	16 4	7,000+ max
<i>Javelin</i>	Individual soldier	45 (carry weight)	Fire and forget	6	2,000 max

CHARACTERISTICS OF US ARMOR AND MECHANIZED WEAPONS

System	Distr per unit	Weapons	Max eff range (meters)	Carried on veh	Fuel consumption (gal/hr)	Fuel capacity (gal)	Cruising range (miles)	Max speed (mph)	Obstacle negotiation
<i>M1A1 TANK</i>	14 per tank co	120-mm	2,500	40	Idle avg: 10.80 Cross country: 56.60 Secondary roads: 44.64	505	289	Hwy: 41.5 Cross country: 30	Vertical step: 3'6" Trench crossing width: 9'
		Cdr .50 cal MG (or 7.62 MG)	1,200-1,600 (900)	1,000					
	9 per cav trp	Coax 7.62 MG	900	10,000					
		Loader 7.62 MG	900	14,000					
		Smoke GL	30	24					
		Thermal	2,000+						

CHARACTERISTICS OF US ARMOR AND MECHANIZED WEAPONS cont									
System	Distr per unit	Weapons	Max eff range (meters)	Carried on veh	Fuel consumption (gal/hr)	Fuel capacity (gal)	Cruising range (miles)	Max speed (mph)	Obstacle negotiation
M2 BFV	14 per mech inf co 14 per AT co	TOW	3,750	7	Idle avg: 6.4 Cross country: 18.0 Secondary roads: 8.6	175	300	Hwy: 41 Cross country: 30 Water: 4.5	Vertical step: 3' Trench crossing width: 8'4"
		25-mm chain gun	APDS: 1,700 ¹ HEI-T: 3,000 ²	225 675 Total: 900					
		Coax 7.62 MG	900	2,340					
		Smoke GL	30	16					
		Thermal	2,000+						
M2 CFV	13 per cav troop	TOW	3,750	12	Idle avg: 6.4 Cross country: 18.0 Secondary roads: 8.6	175	300	Hwy: 41 Cross country: 30 Water: 4.5	Vertical step: 3' Trench crossing width: 8'4"
		25-mm chain gun	APDS: 1,700 ¹ HEI-T: 3,000 ²	425 1,280 Total: 1,705					
		Coax 7.62 MG	900	4,610					
		Smoke GL	30	16					
		Thermal	2,000+						

NOTES:

1. Tracer burnout, otherwise 2,700 meters.

2. Range at which impact is observable and at which round self-destructs. Tracer burnout occurs at 2,500 meters.

CHARACTERISTICS OF US INFANTRY WEAPONS				
WEAPON	WEIGHT (lbs)	COMBAT LOAD	TYPE AMMO	RANGES (meters)
Rifle, 5.56mm M16A1/M16A2	7.62 loaded or 8.48 (M16A2)	140	Ball	M1A1 2,653 max 460 max eff
				M1A2 3,600 max 550 max eff

CHARACTERISTICS OF US INFANTRY WEAPONS cont

WEAPON	WEIGHT (lbs)	COMBAT LOAD	TYPE AMMO	RANGES (meters)
Launcher, grenade 40-mm M203 dual-purpose weapon (DPW)	11 loaded	36 HE	HEDP, HE, CS smoke, star cluster, white star-parachute	400 max 350 area tgt 150 point tgt
Machinegun, grenade 40-mm MK19	76 loaded	400	HEDP HE	2,200 area tgt 1,500 point tgt
Machinegun, cal .50 on M113 APC	84	100 to 2,000	Ball API AP Tracer	6,800 max 1,830 area tgt (APC stationary) 1,500 point tgt (APC stationary)
Machinegun 7.62-mm M60	23	600 to 900	Ball Tracer AP	3,725 max 1,100 area tgt 600 point tgt
Squad automatic weapon (SAW) M249 5.56-mm	16.41	600	Ball Tracer	3,600 max 1,000 suppression 800 area tgt 600 point tgt
Rocket, HE 66-mm M72A2/A3 (LAW)	5.5	1	HEAT	200 stationary tgt 165 moving tgt
Rocket, M136, AT4 (84-mm)	14.8	1	HEAT	300 max eff 30 min tgt

CHARACTERISTICS OF US MORTARS

WEAPON	COMBAT LOAD ROUNDS	RANGE (METERS) (EFFECTIVE) (MIN) (MAX)		WEIGHT (LBS)	RATE OF FIRE (RDS/MIN)	AMMO	NO OF WPNS PER UNIT
120-mm XM120 M998	39	200	7,200	320	4 sustained 15 max for 1 min	HE, WP Illum CS	6 per tank & mech bn
107-mm (4.2 inch) M30 M106A1	88	770	6,840	672	3 sustained 18 max for 1 min	HE, WP Illum CS, HC	6/tk/mech bn
81-mm M29A1	80	70	4,600	121	8 sustained 25 max for 2 min	HE, WP Smoke Illum	4 per abn, AASLT, & lt inf bn

CHARACTERISTICS OF US MORTARS cont							
WEAPON	COMBAT LOAD ROUNDS	RANGE (METERS) (EFFECTIVE)		WEIGHT (LBS)	RATE OF FIRE (RDS/MIN)	AMMO	NO OF WPNS PER UNIT
		(MIN)	(MAX)				
81-mm M252	80	80	5,800	121	15 sustained 30 max for 2 min	HE, WP Smoke Illum	4 per abn, AASLT, & 1t inf bn
M224 60-mm		40	3,480 1,000 ¹	46.5 18.0 ¹	20 sustained 30 max for 4 min	HE, WP Illum	2 per abn, AASLT, & 1t inf bn

NOTES:

1. Hand-held mode.
2. Ranges are affected by the types of cartridges used.
3. The 107-mm mortar, M30 (4.2 inch), and the 120-mm mortar, M120, are the current US heavy mortars. The M120 is replacing the M30, but both will remain in the US inventory for several years.
4. The M106 carrier is the M113 armored personnel carrier modified to carry the 4.2-inch mortar, M30, on a specially designed mount. The M106 carrier has three variants: M106A1, M106A2, and M106A3.
5. The M998, truck cargo, HMMWV, is used to carry the 81-mm mortar and can be used to carry the 107-mm mortar.

CHARACTERISTICS OF US AIR DEFENSE ARTILLERY						
SYSTEM	ACQUISITION RANGE	ENGAGEMENT RANGE	ENGAGEMENT ALTITUDE	NUMBER OF SYSTEMS PER UNIT	MUTUAL SUPPORT DISTANCE	ARMAMENT AMMO BASIC LOAD
Avenger	Visual/FLIR 9-10 km	4+ km	3+ km	12 Avengers/btry (1t, abn, & AASLT bn) 24 Avengers/btry (heavy division)	3 km	8 missiles
Bradley Stinger fighting vehicle	Visual/IR scope	Stinger 4 km TOW 3.7 km 25-mm 1.7 km coax MG 900m	3+ km	8 BSFV/btry 24 BSFV/bn	2 km	6 Stgr msls 5 TOW msls 300 ready 600 stowed
MANPADS (Stinger)	Visual	4+ km	3+ km	2 men/team 5 tms/section 2 secs/plt	2 km	6 msls/tm
Patriot	160 km	160 km	24+ km	8 lchrs/btry 48 lchrs/bn	15 km	32 msls/btry

CHARACTERISTICS OF US AIR DEFENSE ARTILLERY cont						
SYSTEM	ACQUISITION RANGE	ENGAGEMENT RANGE	ENGAGEMENT ALTITUDE	NUMBER OF SYSTEMS PER UNIT	MUTUAL SUPPORT DISTANCE	ARMAMENT AMMO BASIC LOAD
Hawk	80 km	40 km	15 km	3 lchrs/AFP 6 lchrs/btry 18 lchrs/bn	20 km	36 msls/AFP 72 msls/btry
Chaparral	Visual/FLIR 9-10 km	5 km	3+ km	4 chaps/plt 3 plt/btry 36 chaps/bn	2 km	12 msls: 4 ready 8 stowed

NOTES:

1. Chaparral and Hawk are found in the Army National Guard only.
2. Forward-looking Infrared (FLIR) subsystem provides the capability of acquiring a target and automatically tracking it during daylight, darkness, and periods of reduced visibility.

CHARACTERISTICS OF FIELD ARTILLERY										
Weapon	Rds on veh/ prime mover	Rds bulk loaded	Range (meters)	Weight (pounds)	Time to emplace (min)	Max rate of fire- # rds first 3 min	Sustained fire rds per hour	No. of weapons per unit	Ammunition	
									Types	Fuzes
105-mm how towed L119	40	150	11,400 15,100 (RAP)	4,520	3	15	180	18/lt inf FA bn	WP HE HEAT-T Illum Smoke ICM APERS HEP-T	MT PD VT MTSQ BD CP
105-mm how towed M101A1	40	150	11,000 14,500 (RAP)	4,980	3	30	180	18/abn div FA bn		
105-mm how towed M102	40	150	11,500 15,100 (RAP)	3,338	3	30	180	18/lt inf FA bn		
155-mm how towed M114A2 ¹	28	161	14,090 19,300 (RAP)	12,700	5	12	60	18/inf div	HE: WP ICM DPICM, RAP, ADAM, RAAM, Copper-head HC	PD, CP, MTSQ VT, MT
155-mm how SP M109A2/A3	28/36	206	18,100 23,500 (RAP)	53,940	1	12	60	24/armd or mech div FA bn 24/corps FA bn	Illum WP, HC ICM RAP DPICM ADAM RAAM Copper-head	CP PD MT MTSQ VT

CHARACTERISTICS OF FIELD ARTILLERY cont

Weapon	Rds on veh/ prime mover	Rds bulk loaded	Range (meters)	Weight (pounds)	Time to emplace (min)	Max rate of fire- # rds first 3 min	Sustained fire rds per hour	No. of weapons per unit	Ammunition	
									Types	Fuzes
155-mm how M109A6	39	203	24,000 30,000 (RAP)	64,000	1.3	12	60	24/armd or mech div FA bn 24/corps FA bn	Illum WP, HC ICM DPICM RAP, HE ADAM RAAM Copper-head	CP PD MT MTSQ VT
155-mm how M198	28	161	18,000 30,000 (RAP)	15,800	5	12	Variable	24/corps FA bn 8/lt inf div FA btry	HE, Illum RAP ICM DPICM ADAM RAAM HC, WP Copper-head	CP, PD VT MTSQ MT
203-mm how SP M110A2 ¹	2	138	22,900 30,000 (RAP)	62,500	2	5	30	24/corps FA bn	HE DPICM ICM, Nuc Cml RAP	CP MT VT MTSQ PD
MLRS	12	96	30 km	54,000	2-20		12	Armd or mech div FA bn 18 SPL ³ /div 27/corps FA bn	M-77 DPICM ² ATACMS ²	Remotely settable electronic time fuze

NOTES:

1. The 155-mm howitzer, towed M114A2 and 203-mm howitzer, SP M110A2 are found in the Army National Guard only.
2. M39 Army Tactical Missile System (ATACMS) is fired from the M270 multiple-launch rocket system (MLRS) launcher. The ATACMS has a 124+ kilometer range and carries 950 M74 dual-purpose antipersonnel/antimaterial (APAM) bomblets in a 600-square-foot area. To equal the target effect of one nine-launcher ATACMS battery salvo would require a salvo by 33 battalions of 155-mm gun artillery.
3. Self-propelled loader launcher.

CHARACTERISTICS OF US FIELD ARTILLERY AND MORTAR SMOKE

DELIVERY SYSTEM	TYPE ROUND	TIME TO BUILD EFFECTIVE SMOKE	AVERAGE BURNING TIME	AVERAGE OBSCURATION LENGTH (METERS) PER ROUND WIND DIRECTION		
				CROSS	QUARTERING	HEAD/TAIL
155-mm	WP HC	1/2 min 1-1 1/2 min	1 to 1 1/2 min 4 min	150 350	75 250	50 75
105-mm	WP HC	1/2 min 1-1 1/2 min	1 to 1 1/2 min 3 min	75 250	60 175	50 50
107-mm	WP	1/2 min	1 min	200	80	40
81-mm	WP	1/2 min	1 min	100	60	40
60-mm	WP	1/2 min	1 min	75	50	40

FINAL PROTECTIVE FIRE STANDARD WIDTHS

SYSTEM	ELEMENT	SIZE
60-mm mortar	2 tubes	70 by 35 meters
81-mm mortar	4 tubes	140 by 35 meters
107-mm mortar	3 tubes	120 by 40 meters
105-mm howitzer	3 guns	105 by 35 meters
105-mm howitzer	6 guns	210 by 35 meters
155-mm howitzer	4 guns	200 by 50 meters
155-mm howitzer	6 guns	300 by 50 meters
155-mm howitzer	8 guns	400 by 50 meters
203-mm howitzer	4 guns	320 by 80 meters
203-mm howitzer	8 guns	640 by 80 meters

CHARACTERISTICS OF US FIELD ARTILLERY AND MORTAR FLARES

Type Weapon/Round	Range (meters)	Illum Time (sec)	Continuous illum (rd per min)	Diameter of illum area (per rd) (meters)	Candlepower (per rd)
81-mm/M301A3	2,950	75	2	1,100	500,000
107-mm/M335A2	5,490	90	2	1,500	850,000
105-mm/M314A3	11,500	60	3	1,000	450,000
155-mm/M485	17,500	120+	1	2,000	1,000,000
60-mm/M721	3,500	25	4	800	250,000

CHARACTERISTICS OF US SCATTERABLE MINES			
SYSTEM	DELIVERY	APPROXIMATE MINEFIELD SIZE	RAAMS: remote antiarmor mine system. ADAM: area denial artillery munitions. GEMSS: Ground-emplaced, mine-scattering system. Gator: aircraft-delivered system. MOPMS: modular pack mine system. Volcano: Mine dispenser mounted on a variety of platforms.
RAAMS/ADAM	155-mm how	400 x 400 meters	
GEMSS	Towed dispenser	60 x 250 meters	
Gator	Navy, AF aircft	Altitude and speed dependent 200 x 650 m avg	
MOPMS	Hand	70 x 35 meters	
Volcano	Helicopter or vehicle-mounted dispenser	1,115 x 140 m 1,110 x 120 m	

There are two types of FA-delivered scatterable mines:

- The remote antiarmor mine system (RAAMS) projectile contains nine antitank mines.
- The area denial artillery munition (ADAM) projectile contains 36 antipersonnel mines.

These mines can be fired only from the 155-mm family of weapons. Two different RAAMS and ADAM projectiles are used to achieve long-term (greater than 24 hours) or short-term (less than 24 hours) self-destruct times.

Based on the corps or division commander's desires to shape the battlefield, the authority to employ mines must be positively delegated or withheld. The corps or division commander's guidance concerning family of scatterable mines (FASCAM) is found in the operation order or plan in the subparagraph titled "Engineer." Normally, authority to employ FA-delivered, short-term, self-destruct mines is delegated to brigades, and authority to employ long-term, self-destruct mines is delegated to divisions. Minefield placements are reported up through fire support element (FSE) channels to the G3 and/or engineer for dissemination to maneuver and supported elements.

CHARACTERISTICS OF US HELICOPTERS					
TYPE AIRCRAFT	WEAPON ¹ SYSTEM	MAXIMUM NUMBER OF ROUNDS	MAX EFF RANGE (m) (WEAPONS)	RANGE (HELICOPTERS)	AVERAGE SPEED (knots) ²
AH-1S	20-mm Cannon M197 (Vulcan)	750	1,500	480 km	120
	2.75-in rocket	38 (two rocket pods of 19 each) or 14 (two pods of 7 each)	9,000 (indirect)		
	TOW	8	3,750		
AH-64	30-mm chain gun	1,200	3,000	480 km 800km w/ auxs tanks ³	140
	2.75-in rocket	76 pods (four rkt pads of 19 each)	9,000 (indirect)		
	Hellfire missile	16	7,000+		
OH-58D (Kiowa warrior)	.50 cal MG	500	2,000	413 km	110
	2.75-in rocket	7	9,000 (indirect)		
	Hellfire missile or Air-to-air Stinger	4 or 4	7,000+ 5,000		

NOTES:

1. Can be armed with any system or combination, if maximum rounds are reduced.
2. Low-level flight for planning route to and from deep attack target. Nap of the earth flight speed averages 35 knots (65 kmph).
3. The AH-64 can carry 1, 2, or 4 auxiliary tanks.

CHARACTERISTICS OF US UTILITY HELICOPTERS						
Type aircraft	Max range (NM) (km)		Cruise speed (knots)	Endurance (hours)	Normal internal payload (lbs)	Max external payload (lbs)
UH-60	319	592	139	2.18	2,640	8,000
CH-47D	387	717	140	2.5	20,206	30,000

NOTE:

The UH-60 can be fitted with two or four external fuel tanks which can give it 6 hours endurance (about 1,400 kms).